

## Listing of Claims

Claims 44-48 (canceled)

Claim 49 (currently amended): The apparatus of claim [44] 59, wherein the additive consumption inhibiting aldehyde comprises from about 0.001 g/L to about 100.0 g/L of the bath.

Claim 50 (currently amended): The apparatus of claim [44] 59, wherein the metal plating bath further comprises brighteners, levelers, hardeners, wetting agents, malleability modifiers, ductility modifiers, deposition modifiers, or suppressors.

Claim 51 (currently amended): The apparatus of claim [44] 59, wherein the pH of the metal plating bath is from 0 to about 8.0.

Claim 52 (currently amended): The apparatus of claim [44] 59, wherein the metal salt comprises copper halides, copper sulfate, copper alkane sulfonate, copper alkanol sulfonate, or mixtures thereof.

Claim 53 (currently amended): The apparatus of claim [44] 59, wherein the insoluble anode comprises metals of cobalt, nickel, ruthenium, rhodium, palladium, iridium, or platinum.

Claim 54 (original): The apparatus of claim 53, wherein the insoluble anode further comprises metals of titanium, zirconium, hafnium, vanadium, niobium, or tantalum.

Claim 55 (original): The apparatus of claim 54, wherein the insoluble anode further comprises metals of beryllium, calcium, strontium, barium, scandium, yttrium, lanthanum, or rare earth elements.

Claim 56 (currently amended): The apparatus of claim [44] 59, wherein the insoluble anode comprises iridium dioxide.

Claim 57 (currently amended): The apparatus of claim [44] 59, wherein the cathode comprises a wiring board, an integrated circuit, an electrical contact surface, a connector, an electrolytic foil, a silicon wafer, a semiconductor, a lead frame, an optoelectronic component, a solder bump, a decorative article, or a sanitary appliance [and the like].

Claim 58 (currently amended): The apparatus of claim [44] 59, wherein the insoluble anode and the cathode have a current density of [from] about 1 to about 1000 amps/ft<sup>2</sup>.

Claim 59 (new): An apparatus for electroplating a substrate comprising an electrical power source electrically connected with an insoluble anode and a cathode such that an electrical current can pass through the insoluble anode and the cathode, the insoluble anode and the

cathode are in contact with a metal plating bath comprising and additive consumption inhibiting aldehyde with a formula:



where  $R^1$  is ( $C_1$ - $C_{20}$ ) linear, branched or cyclic alkyl; ( $C_2$ - $C_{20}$ ) linear or branched alkenyl; ( $C_2$ - $C_{20}$ ) linear or branched alkynyl; ( $C_1$ - $C_{20}$ ) alkyl- $O(C_2$ - $C_3O)_ $x$  $R^2$ ; ( $C_1$ - $C_{12}$ ) alkylphenyl- $O(C_2$ - $C_3O)_ $x$  $R^2$ ; or phenyl- $O(C_2$ - $C_3O)_ $x$  $R^2$ ; where  $x$  is an integer of 1-500 and  $R^2$  is hydrogen, ( $C_1$ - $C_4$ )alkyl, or phenyl; the ( $C_1$ - $C_{20}$ )alkyl, ( $C_2$ - $C_{20}$ )alkenyl and ( $C_2$ - $C_{20}$ )alkenyl may be substituted or unsubstituted; and a salt of a metal selected from the group consisting of copper, silver, palladium, platinum, cobalt, chromium, bismuth, indium, rhodium, iridium and ruthenium; and one or more brighteners having formulas:  $HO_3SR^{11}$ -SH,  $HO_3S-R^{11}$ -S-S- $R^{11}$ - $SO_3H$  and  $HO_3S-Ar-S-S-Ar-SO_3H$ , where  $R^{11}$  is  $C_1$ - $C_6$  or an aryl group and Ar is phenyl or naphthyl.$$$

Claim 60 (new): The apparatus of claim 59, wherein the ( $C_1$ - $C_{20}$ )alkyl, ( $C_2$ - $C_{20}$ )alkenyl and the ( $C_2$ - $C_{20}$ )alkynyl are substituted with one or more substituents comprising halogen aryl, -SH, -CN, silyl, silane, -SCN, -C=NS, -Si(OH)<sub>3</sub>, -NO<sub>2</sub>, -SO<sub>3</sub>M, -PO<sub>3</sub>M, -P(R)<sub>2</sub>, -OH, -COOH, -CHO, -COO( $C_1$ - $C_{12}$ )alkyl, -CO( $C_1$ - $C_{12}$ )alkyl, or NR<sup>3</sup>R<sup>4</sup>, where R<sup>3</sup> and R<sup>4</sup> are independently hydrogen, aryl, or ( $C_1$ - $C_{12}$ )alkyl; and M is hydrogen, or alkali metal, and R is hydrogen or halogen.

Claim 61 (new): An apparatus for electroplating a substrate comprising an electrical power source electrically connected with an insoluble anode and a cathode such that an electrical current can pass through the insoluble anode and the cathode, the insoluble anode and the cathode are in contact with a metal plating bath comprising 2,3,4-trihydroxybenzaldehyde, 3-hydroxybenzaldehyde, 3,4,5-trihydroxybenzaldehyde, 2,4-dihydroxybenzaldehyde, 4-hydroxy-3-methoxycinnamaldehyde, 3,4,5-trihydroxybenzaldehyde monohydrate, syringaldehyde, 2,5-dihydroxybenzaldehyde, 2,4,5-trihydroxybenzaldehyde, 3,5,-hydroxybenzaldehyde, 3,4-dihydroxybenzaldehyde, 4-hydroxybenzaldehyde, 4-carboxybenzaldehyde, furaldehyde or mixtures thereof; a salt of a metal selected from the group consisting of copper, silver, palladium, platinum, cobalt, chromium, bismuth, indium, rhodium, iridium and ruthenium; and one or more brighteners having formulas:  $HO_3S-R^{11}$ -SH,  $HO_3S-R^{11}$ -S-S- $R^{11}$ - $SO_3H$  and  $HO_3S-Ar-S-S-Ar-SO_3H$ , where  $R^{11}$  is  $C_1$ - $C_6$  or an aryl group and Ar is phenyl or naphthyl.